Exercise 1: Specialization and Trade

Problem 1 (*Gains from Trade*)

Two pirates, Jack and Will, are stranded on a lonely island in the Caribbean. Each of them spends 40 hours per week fishing and/or distilling rum. In one hour, Jack can produce either 1 kg fish or $\frac{1}{4}$ kg rum, while Will can produce either $\frac{1}{5}$ kg fish or $\frac{1}{5}$ kg rum. Each pirate wants to consume exactly 5 kg rum per week and as much fish as possible.

(a) Determine, who has comparative and absolute advantages in the production of fish and rum, respectively.

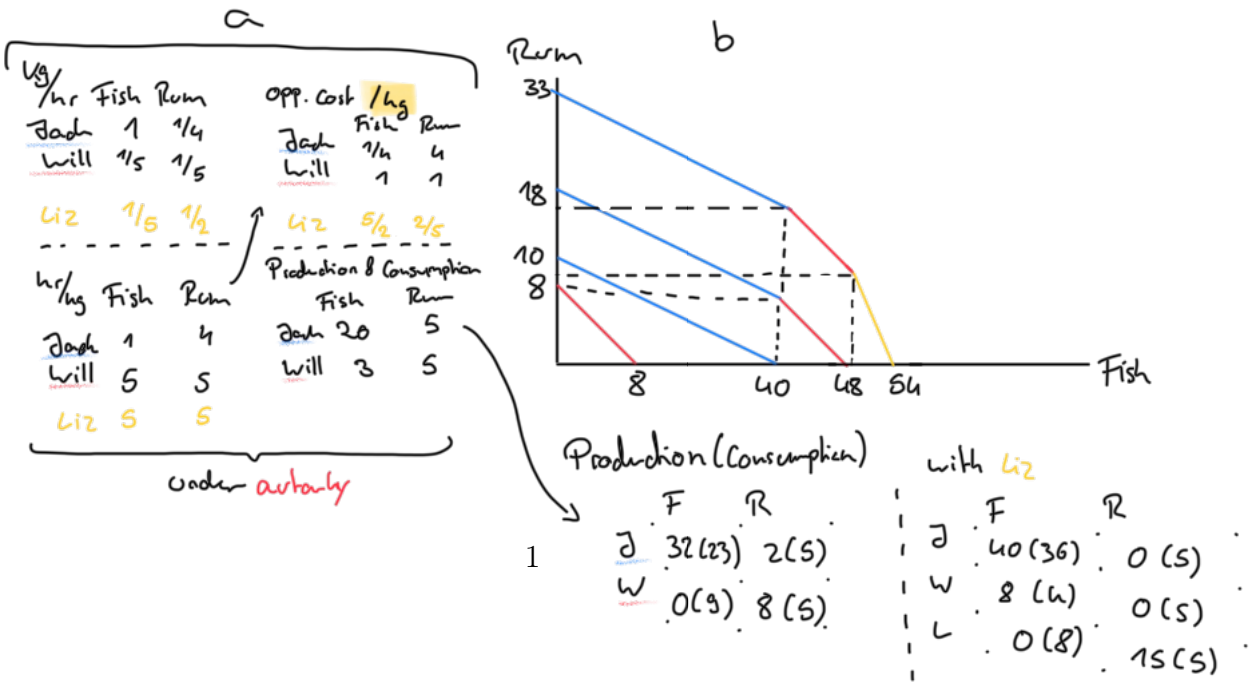
(b) Draw the individual transformation curves as well as the joint transformation curve of the two pirates in a diagram with fish on the horizontal and rum on the vertical axis.

(c) Determine how each pirate's consumption of fish changes compared to autarky if the two pirates agree to trade 1 kg rum for 3 kg fish.

Jack and Will are joined by Liz, another stranded pirate, who spends 30 hours per week fishing and/or distilling rum. In one hour, Liz can produce either $\frac{1}{5}$ kg fish or $\frac{1}{2}$ kg rum. Just like the other two pirates, Liz wants to consume exactly 5 kg rum per week and as much fish as possible.

(d) Draw the joint transformation curve of the three pirates in a diagram with fish on the horizontal and rum on the vertical axis.

(e) Determine how each pirate's consumption of fish changes compared to autarky if the three pirates agree to trade 1 kg rum for $\frac{4}{5}$ kg fish.



Problems 2-6 (*Gains from Trade*)

Carl and Gottlieb are engineers. Each of them spends 300 days per year manufacturing motor vehicles. Every vehicle consists of a car body and an engine. Carl's car bodies are compatible with Gottlieb's engines and vice versa. To manufacture a car body, Carl needs 16 days while Gottlieb needs 10 days. To manufacture an engine, Carl needs 4 days while Gottlieb needs 5 days.

Problem 2

Who has an absolute advantage, and who has a comparative advantage?

(A) Carl has both, an absolute and a comparative advantage in the production of car bodies.

(B) Gottlieb has both, an absolute and a comparative advantage in the production of car bodies.

(C) Carl has an absolute advantage in the production of car bodies and a comparative advantage in the production of engines.

(D) Gottlieb has an absolute advantage in the production of car bodies and a comparative advantage in the production of engines.

Problem 3

How many vehicles can each engineer maximally manufacture per year under autarky?

(A) Carl 20 and Gottlieb 15 vehicles

(B) Carl 18.75 and Gottlieb 30 vehicles

(C) Carl 15 and Gottlieb 20 vehicles

(D) Carl 30 and Gottlieb 18.75 vehicles

Problem 4

How many vehicles can both engineers together maximally manufacture per year if they cooperate?

(A) 36 vehicles

(B) 39 vehicles

(C) 49 vehicles

(D) 56 vehicles

Problem 5

Carl and Gottlieb can realize mutual gains from specialization and trade if they agree on terms of trade

(A) between $\frac{1}{4}$ and $\frac{1}{2}$ car bodies per engine.

(B) between 1 and 2 engines per car body.

(C) between $\frac{5}{8}$ and $\frac{4}{5}$ engines per car body.

(D) between 2 and 4 car bodies per engine.

Problem 6

Which of the following combinations is *not* located on the joint transformation curve of Carl and Gottlieb? Christian likes problems like this in exams

(A) 0 car bodies and 135 engines

(B) 10 car bodies and 115 engines for 10 bodies; 115 engines can be produced

(C) 30 car bodies and 75 engines

(D) 39 car bodies and 50 engines max cars is 35; this is above the curve

②

d/unit	B Bodies	E Engines
Carl	16	4
Gottlieb	10	5

absolute advantage

Opp. Cost		
Carl	4	1/4
Gottlieb	2	1/2

comparative adv.

③

Transformation Curve (Autarky)

B/yr

Carl.

i $B = 18.75 - \frac{1}{4}E$

ii $B = E$

$\Rightarrow B = 15,\ E = 15$

curve $a = -\frac{1}{4}$

Gottlieb

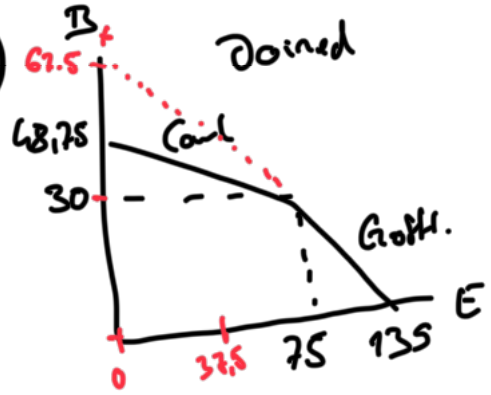
$B = 30 - \frac{1}{2}E$

$B = E$

$B = 20 \quad E = 20$

$a = -\frac{1}{2}$

④



$$B = \begin{cases} 48.75 - \frac{1}{4}E & 0 \le E \le 75 \\ 67.5 - \frac{1}{2}E & 75 \le E \le 135 \end{cases}$$

$B = E$

$\Rightarrow B = 39,\ E = 39$ Maximum joined Product

Joined	B	E
C	9	39
G	30	0

↳ Gottlieb (comp. adv.) starts with as many B as possible

x: traded B ; y: traded E ; $t = \frac{x}{y}$ trade terms

come up w/ smth, like 4/11 here } made up

In range of opportunity cost

Here: $\frac{1}{4} \leq \frac{x}{y} \leq \frac{1}{2}$; $2 \leq \frac{y}{x} \leq 4$

Carl

$B = 9 + x$; $B = E$

$E = 39 - y \Rightarrow y = \frac{30}{1+t}$

$x = ty$

$t = \frac{4}{11}$; $y = 22$; $x = 8$

Gottlieb

$B = 30 - x$; $E = 0 + y$; $B = E$

$x = ty = x =$; $y =$